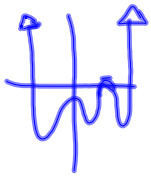
Warmup!
1. Sketch a graph of a function with degree of 6, maximum number of turning points, positive leading coefficient, 4 real roots, where one is a double root.



7-7 Operations on Functions

$f(x) = 3x^2 + 7x$

$g(x) = 2x^2 - x - 1$

$f(-1) = 3(-1)^2 + 7(-1)$ $-4$

$g(-1) = 2(-1)^2 - (-1) - 1$ $2$

$f(x) = 3x^2 + 7x$

$g(x) = 2x^2 - x - 1$

SUM $(f + g)x = f(x) + g(x)$

$(f + g)x = 5x^2 + 6x - 1$

$f(x) = 3x^2 + 7x$

$g(x) = 2x^2 - x - 1$

Difference $(f - g)x = f(x) - g(x)$

$(f - g)x = 3x^2+7x - (2x^2 - x - 1)$

$-2x^2 + x + 1$

$x^2 + 8x + 1$

$f(x) = 3x^2 + 7x$

$g(x) = 2x^2 - x - 1$

Product $(f \bullet g)x = f(x) \bullet g(x)$

$(f \bullet g)x = (3x^2+7x)(2x^2-x-1)$

$6x^4 - 3x^3 - 3x^2$

$+11x^3 - 7x^2 - 7x$

$= 6x^4 + 11x^3 - 10x^2 - 7x$

$f(x) = 3x^2 + 7x$

$g(x) = 2x^2 - x - 1$

Quotient $\left(\frac{f}{g}\right)x = f(x) \div g(x)$

$\left(\frac{f}{g}\right)x = \frac{3x^2+7x}{2x^2-x-1} = \frac{x(3x+7)}{(2x+1)(x-1)}$

$x \neq -\frac{1}{2}, x \neq 1$

$-2 \quad 1$

$-2 \quad -1$

Composition of Functions
$f(x) = 3x^2 - 2x + 1$

$g(x) = x - 4$

$[f \circ g](x) = f[g(x)]$

$[g \circ f](x) = g[f(x)]$

Composition of Functions
$f(x) = 3x^2 - 2x + 1$

$g(x) = x - 4$

$[f \circ g](3) =$

$g(3) = -1$

$f(-1) = 3(-1)^2 - 2(-1) + 1$

$[f \circ g](3) = 6$

Composition of Functions
$f(x) = 3x^2 - 2x + 1$

$g(x) = x - 4$

$[f \circ g](7) =$

$g(7) = 7 - 4 = 3$

$f(3) = 3(3)^2 - 2(3) + 1$

$[f \circ g](7) = 22$

Composition of Functions
$f(x) = 3x^2 - 2x + 1$

$g(x) = x - 4$

$[g \circ f](3) = 18$

$f(3) = 3(3)^2 - 2(3) + 1$

$g(22) = 18$

Composition of Functions
$f(x) = 3x^2 - 2x + 1$

$g(x) = x - 4$

$g[f(2)] = 5$

$3(2)^2 - 2(2) + 1$

$g(9) = 5$

Composition of Functions
$f(x) = 3x^2 - 2x + 1$

$g(x) = x - 4$

$[f \circ g](x) = f[g(x)]$

$g(x) = x - 4$

$f(x-4) = 3(x-4)^2 - 2(x-4) + 1$

$3(x^2 - 8x + 16) - 2x + 8 + 1$

$3x^2 - 24x + 48 - 2x + 9$

$[f \circ g](x) = 3x^2 - 26x + 57$

Composition of Functions
$f(x) = 3x^2 - 2x + 1$

$g(x) = x - 4$

$[g \circ f](x) = g[f(x)]$

$f(x) = 3x^2 - 2x + 1$

$g(3x^2 - 2x + 1) = 3x^2 - 2x + 1 - 4$

$[g \circ f](x) = 3x^2 - 2x - 3$

Sets

f = {(2,6) (9,4) (7,7) (0, -1)}

g = {(7,0) (-1,7) (4,9) (8,2)}

$f \circ g = \{(7,-1)(-1,7)(4,4)(8,6)\}$

Sets

f = {(2,6) (9,4) (7,7) (0, -1)}

g = {(7,0) (-1,7) (4,9) (8,2)}

$g \circ f = \{(9,9)(7,0)(0,7)\}$

DO:

f = {(8,9) (6,4) (10,9) (12,6)}

g = {(6,8) (4,6) (8,9) (9,12)}

$f \circ g = \{(6,9)(4,4)(9,6)\}$

$g \circ f = \{(8,12)(4,6)(10,12)(12,8)\}$

Hw
p387-388
17, 20, 23, 25,26,31,
35, 41, 45